LEVEL II

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FACTOR STABILITY OF THE WORK ENVIRONMENT QUESTIONNAIRE

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BACKGROUND

Many instruments have been developed during the past 10 to 15 years for the purpose of surveying organizations, to assess attitudes or climate, to diagnose problems with organizational processes, or to deal with other concerns. Unfortunately, many of these instruments have not been sufficiently well studied to assure their reliability and validity. One project of the Organizational Effectiveness Technical Area has been the development of a reliable and valid organizational diagnostic instrument called the Work Environment Questionnaire (WEQ). A detailed report on the initial development, reliability, and validity of the WEQ in an ongoing Army work environment was provided by Turney and Cohen (1976). The present research, an effort to cross-validate the WEQ, focuses on the stability of the factor structure of the WEQ in a second Army work environment.

Interpretations of factor analysis and comparisons of factor structures have most frequently been subjective assessments by the researchers. However, Harman (1967) presents a coefficient of congruence which provides a quantitative measure of the degree of congruence between factor loadings of variables between two independent samples. This coefficient of congruence is very similar in form to a product-moment coefficient of correlation. It can range in value from ≠1 for perfect congruence between two sets of factor loadings; through 0 for a complete absence of congruence between two sets of loadings; to -1 for a perfect invense congruent relationship between two sets of loadings. Harman suggests that the coefficient of congruence is an appropriate method for the identification of common factors across different survey samples.

The prescnt report examines the factor stability of the WEQ across two samples of soldiers working in different types of work environments.

METHOD

Sample

The survey was conducted as part of the initial diagnostic phase of an organizational effectiveness program being conducted in two Army commands. Questionnaires were completed in small groups during duty hours.

The survey respondents were US Army enlisted personnel. Sample 1 consisted of 122 communications specialists at a field station in Germany. One hundred and seventeen questionnaires (95.9%) were filled out completely.

The respondents in Sample 2 were 580 members of 32d AADCOM missle batteries at 13 sites in Germany. Complete data were available for 535 respondents (95.0%) in Sample 2.

Measures

The present report focuses on the 25-item section of the WEQ concerned with various aspects of the work environment. Item format was a seven-point rating scale with "strongly agree" and "strongly disagree" as the anchor points. The questionnaire included items on work group norms, task requirements, communication, and supervision. Turney and Cohen (1976) present a detailed account of the item development and selection.

Statistical Computations

The data from the two samples were factor analyzed using the Statistical Package for the Social Sciences (SPSS) principal factor program with varimax rotation. The stability of the factor structure was then evaluated by computing the coefficient of congruence (Harman, 1967) between all inter-sample pairs) so that each set of factor loadings in one sample was paired with every set of factor loadings in the other sample.

RESULTS

The SPSS program automatically deletes all factors with an associated eigenvalue of less than 1.0. This criterion resulted in a five factor solution for Sample 1 and a four factor solution for Sample 2. A second set of factor solutions was calculated so that both the four and five factor solutions were available for Samples 1 and 2.

Tables 1-4 present the four and five factor solutions for both samples. The four factor solution for both samples produced Supervision, Group Cohesion, Job Responsibility, and Performance-Reward Contingency as factors. The five factor solution for Sample 1 resulted in Supervision, Supervision-Consideration/Performance-Reward Contingency, Job Responsibility, Group Cohesion, and Group Performance factors. The Sample 2 five factor solution had Supervision, Performance-Reward Contingency, Job Responsibility, Group Cohesion, and a fifth factor with no items having high loadings.

Inspection of Tables 1-4 suggests that the factor solutions for the two samples are very similar. This conclusion is supported by the coefficients of congruence presented in Tables 5 and 6. Table 5 shows that four factor solution coefficients of congruence between the Sample 1 and Sample 2 Supervision, Group Cohesion, and Job Responsibility factors are high (0.96, 0.83, and 0.87, respectively), indicating stability of these factors over the two samples. The Performance-Reward Contingency factor coefficient of congruence is moderately high (0.76), but the coefficient of congruence between that factor and the Supervision factor in the other sample is slightly larger for both Sample 1 (.78) and Sample 2 (.85). This finding suggests some overlap between the Supervision and Performance-Reward Contingency factors in both samples.

The coefficients of congruence for the five factor solution (Table 6) lead to a similar conclusion. The Supervision, Job Responsibility, and

Table 1

Factor Loadings for Sample 1 Four Factor Solution
(n=117)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
1. Performance meaningfully evaluated by supervisor	.54	.08	.20	.50
2. Supervisor sets clear goals	.69	.22	.20	.32
3. Supervisor concerned with work quality	.61	-.05	.15	.26
4. Coworkers not encourage superior performance	-.14	-.63	-.20	.14
5. Supervisor goes out of way to help me	.64	.04	.40	.38
6. Supervisor conveys clear evaluation standards	.72	.13	.37	.15
7. Job makes good use of abilities	.18	-.02	.62	.09
8. Job duties clearly defined by supervisor	.75	.09	.14	.04
9. Group works well together	-.03	.70	-.04	.21
10. Most deserving are promoted	.39	.26	.27	.27
11. Other agency jobs better utilize my abilities	.15	-.10	-.36	-.10
12. Members of my group stick together	.01	.63	-.22	.33

Note: Item-factor correlations $\geq$ .50 are underlined.

Table 1 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
13. Supervisior encourages me to help with work methods	.53	.11	.45	.36
14. I now feel my job is as important as in initial training	.32	-.01	.51	.35
15. Supervisor makes clear aspects of performance he considers important	.70	.03	.12	.24
16. Supervisor assigns me tasks I am best doing	.52	.08	.39	.12
17. If I perform outstandingly, my supervisor will recommend me for an award	.33	.08	.23	.71
18. I receive clear job instructions from my supervisor	.84	.02	.25	.15
19. Supervisor properly monitors my performance	.69	.01	.19	.18
20. Instructions given by my supervisor never conflict with other information	.55	.17	.33	.07
21. If I perform poorly, supervisor corrects my behavior	.54	-.02	.11	.07

Table 1 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
22. Supervisor has clearly defined responsibilities	.59	.09	.26	.14
23. Coworkers emphasize superior performance	.10	.79	.37	-.11
24. I have the opportunity to work as hard as I want	.24	.11	.41	.08
25. Supervisor commends me for outstanding performance	.39	.13	.34	.55

Table 2

Factor Loadings for Sample 2 Four Factor Solution
(n=535)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
1. Performance meaningfully evaluated by supervisor	.67	.18	.16	.22
2. Supervisor sets clear goals	.84	.15	.18	.11
3. Supervisor concerned with work quality	.70	.15	.17	.01
4. Coworkers not encourage superior performance	.01	-.16	-.01	-.03
5. Supervisor goes out of way to help me	.73	.10	.19	.28
6. Supervisor conveys clear evaluation standards	.67	.14	.16	.28
7. Job makes good use of abilities	.36	.20	.69	.12
8. Job duties clearly defined by supervisor	.69	.18	.21	.26
9. Group works well together	.37	.73	.11	.03
10. Most deserving are promoted	.27	.27	.24	.34
11. Other agency jobs better utilize my abilities	.05	.05	-.33	-.01
12. Members of my group stick together	.24	.68	.10	.12

Note: Item-factor correlations $\geq .50$ are underlined.

Table 2 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
13. Supervisior encourages me to help with work methods	.67	.28	.18	.28
14. I now feel my job is as important as in initial training	.29	.29	.56	.22
15. Supervisor makes clear aspects of performance he considers important	.68	.24	.14	.29
16. Supervisor assigns me tasks I am best doing	.55	.17	.34	.37
17. If I perform outstandingly, my supervisor will recommend me for an award	.47	.17	.19	.56
18. I receive clear job instructions from my supervisor	.68	.14	.10	.46
19. Supervisor properly monitors my performance	.63	.15	-.02	.45
20. Instructions given by my supervisor never conflict with other information	.33	.22	.21	.47
21. If I perform poorly, supervisor corrects my behavior	.47	.20	-.06	.20

Table 2 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency
22. Supervisor has clearly defined responsibilities	.57	.23	-.00	.32
23. Coworkers emphasize superior performance	.34	.57	.13	.22
24. I have the opportunity to work as hard as I want	.28	.20	.42	.33
25. Supervisor commends me for outstanding performance	.50	.16	.11	.53

Table 3

Factor Loadings for Sample 1 Five Factor Solution
(n=117)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Supervision-Consideration	V Group Performance
1. Performance meaningfully evaluated by supervisor	.47	.14	.15	.57	.01
2. Supervisor sets clear goals	.65	.21	.22	.37	.12
3. Supervisor concerned with work quality	.56	-.06	.06	.41	.02
4. Coworkers not encourage superior performance	-.11	-.20	-.03	-.04	-.73
5. Supervisor goes out of way to help me	.56	-.02	.32	.54	.10
6. Supervisor conveys clear evaluation standards	.67	-.03	.28	.35	.23
7. Job makes good use of abilities	.13	-.16	.57	.22	.12
8. Job duties clearly defined by supervisor	.73	-.01	.12	.18	.15
9. Group works well together	-.03	.69	.10	.04	.29
10. Most deserving are promoted	.38	.28	.37	.23	.09
11. Other agency jobs better utilize my abilities	-.14	-.10	-.47	-.06	-.03
12. Members of my group stick together	.03	.76	-.06	.11	.15

Note: Item-factor correlations $\geq$ .50 are underlined.

Table 3 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Supervision-Consideration	V Group Performance
13. Supervisor encourages me to help with work methods	.43	-.05	.26	.62	.24
14. I now feel my job is as important as in initial training	.27	.01	.53	.40	-.02
15. Supervisor makes clear aspects of performance he considers important	.66	.03	.10	.34	.03
16. Supervisor assigns me tasks I am best doing	.46	-.15	.21	.37	.28
17. If I perform outstandingly, my supervisor will recommend me for an award	.27	.24	.22	.69	-.08
18. I receive clear job instructions from my supervisor	.80	-.05	.23	.30	.08
19. Supervisor properly monitors my performance	.66	-.01	.17	.29	.04
20. Instructions given by my supervisor never conflict with other information	.57	.14	.47	.03	.09
21. If I perform poorly, supervisor corrects my behavior	.55	.03	.20	.06	-.06

Table 3 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Supervision-Consideration	V Group Performance
22. Supervisor has clearly defined responsibilities	.59	.10	.35	.14	.02
23. Coworkers emphasize superior performance	.06	.30	.23	.06	.83
24. I have the opportunity to work as hard as I want	.21	.00	.41	.15	.14
25. Supervisor commends me for outstanding performance	.30	.12	.23	.68	.11

Table 4

Factor Loadings for Sample 2 Five Factor Solution
(n=535)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency	V Undefined[a]
1. Performance meaningfully evaluated by supervisor	.62	.18	.14	.29	.17
2. Supervisor sets clear goals	.82	.15	.13	.24	.05
3. Supervisor concerned with work quality	.68	.16	.15	.10	.13
4. Coworkers not encourage superior performance	.03	-.16	-.02	-.02	-.07
5. Supervisor goes out of way to help me	.71	.11	.12	.39	.02
6. Supervisor conveys clear evaluation standards	.63	.14	.11	.38	.06
7. Job makes good use of abilities	.35	.21	.70	.16	.07
8. Job duties clearly defined by supervisor	.63	.18	.21	.32	.24
9. Group works well together	.37	.74	.06	.11	-.02
10. Most deserving are promoted	.22	.26	.22	.37	.10
11. Other agency jobs better utilize my abilities	.03	.04	-.33	-.01	.03
12. Members of my group stick together	.23	.69	.04	.19	-.06

Note: Item-factor correlations $\geq$ .50 are underlined.

[a]No item loading over 0.50

Table 4 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency	V Undefined[a]
13. Supervisor encourages me to help with work methods	.64	.28	.12	.39	.05
14. I now feel my job is as important as in initial training	.27	.29	.55	.27	.07
15. Supervisor makes clear aspects of performance he considers important	.61	.23	.13	.35	.23
16. Supervisor assigns me tasks I am best doing	.52	.17	.28	.49	-.02
17. If I perform outstandingly, my supervisor will recommend me for an award	.40	.16	.14	.66	.05
18. I receive clear job instructions from my supervisor	.60	.13	.08	.53	.22
19. Supervisor properly monitors my performance	.53	.14	-.01	.47	.35
20. Instructions given by my supervisor never conflict with other information	.27	.21	.19	.51	.13
21. If I perform poorly, supervisor corrects my behavior	.38	.19	-.02	.16	.49

[a]No item loading over 0.50

Table 4 (continued)

Item	I Supervision	II Group Cohesion	III Job Responsibility	IV Performance-Reward Contingency	V Undefined[a]
22. Supervisor has clearly defined responsibilities	.48	.22	.24	.33	.38
23. Coworkers emphasize superior performance	.28	.57	.15	.24	.23
24. I have the opportunity to work as hard as I want	.24	.20	.40	.37	.08
25. Supervisor commends me for outstanding performance	.42	.15	.08	.59	.15

[a]No item loading over 0.50

Table 5

Coefficients of Congruence for the Four Factor Solutions

Sample 1	Sample 2			
	I	II	III	IV
I	.96	.55	.58	.85
II	.39	.83	.31	.37
III	.75	.56	.87	.78
IV	.78	.59	.58	.76

Table 6

Coefficients of Congruence for the Five Factor Solutions

Sample 1	Sample 2				
	I	II	III	IV	V
I	.94	.53	.52	.86	.78
II	.27	.78	.11	.30	.14
III	.70	.57	.87	.78	.55
IV	.88	.54	.58	.87	.50
V	.42	.65	.35	.41	.31

Group Cohesion coefficients of congruence were high (0.94, 0.88, and 0.78, respectively), again indicating stability of the factors across samples. Also, as in the four factor solution, the Performance-Reward Contingency factors have high coefficients of congruence with the Supervision factor. The fifth factor in Sample 1, Group Performance, does not have a high coefficient of congruence with any of the Sample 2 factors.

DISCUSSION AND CONCLUSIONS

The coefficient of congruence matrices indicate that the Supervision and Performance-Reward Contingency factors are vey similar. The high coefficients of congruence between these two factors may be due to the role of the supervisor as the purveyor of rewards in the work environment. The items with high loadings on the Performance-Reward Contingency factor all specify the supervisor as the agent of rewards. Thus, the Performance-Reward Contingency factor appears to focus on one role of a supervisor--the purveyor of rewards.

The high interrelationship between the Supervision and Performance-Reward Contingency factors is consistent with the findings of Shiflett, Turney, and Cohen (in press). When Shiflett et al examined the relationship of the WEQ to several measures of job facet satisfaction and organizational characteristics, they found many of the variables to be so intricately intertwined with one another that a change in one variable was likely to result in, or be associated with, a change in a variety of other variables.

Examination of the WEQ items suggest that the WEQ factors are similar to those found in other organizational diagnostic instruments. For example, the WEQ Supervision factor appears to encompass concepts similar to the Consideration and Initiation of Structure scales in the Leadership Behavior Description Questionnaire (Halpin & Winer, 1957). The Supervision items also are similar in content to the Supervisory Leadership scales of the Survey of Organizations (SOO) (Taylor & Bowers, 1972).

The Group Cohesion factor of the WEQ also overlaps in content those found in the goal emphasis and interactive facilitation subscales of the SOO Peer Leadership factor.

Turney and Cohen (1976) have demonstrated the reliability and validity of the WEQ. The present paper demonstrates the factor stability of the instrument over two heterogeneous samples of soldiers. The men in one sample were specialists in highly sophisticated communication equipment. The 32d AADCOM sample represented a cross section of maintenance and operational personnel for a missile battery.

The Turney and Cohen paper and the present paper combine to provide strong support for the utility of the WEQ as an organizational diagnostic instrument for the identification of organizational problem areas in on-going Army work environments. The WEQ has been demonstrated to be a reliable, valid, and factor analytically stable instrument for assessing supervision, work group cohesion, job responsibility, and performance-reward contingencies in the work environment.

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